

Technical News Bulletin

of the
National Bureau of Standards

★ Issued Monthly ★

Washington

APRIL 1939¹

Number 264

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CELLULOSE-ACETATE SHEETING FOR PROTECTION OF DOCUMENTS

The process of laminating paper with transparent cellulose-acetate sheeting as a preservative measure, developed several years ago at the Bureau, has come into considerable use.

The first application of the process in the documentary field was by the National Archives of the United States. It was chosen as the best, and in fact, the only feasible means of laminating the vast number of documents received by the National Archives, which require such treatment. The process is speedy and has many advantages. The sheeting is applied by means of heat and pressure, no adhesive being used, and a homogeneous unit is obtained, as the cellulose sheeting is actually forced into the pores of the paper. The acetate sheeting used is very stable, has high transparency and strength, is very thin, is easily cleaned with water, and is resistant to insects. These are all prop-

erties that are particularly desirable for documentary purposes.

Four commercial operators make a business of laminating documents with the acetate sheeting. Two of these use only heat and pressure; the other two use an adhesive in addition. An adhesive permits lamination at lower temperatures and pressures, but care must be taken that the adhesive is stable, and that it will not cause deterioration of the laminated paper.

Because of the high stability and other good qualities of the acetate sheeting, as shown in the Bureau's reports, it is also finding considerable use in the form of envelopes for the protection of stamps and other kinds of sheets, where lamination is not desirable.

DETERMINATION OF PENTOSANS IN PULPS AND PAPERS

In the Bureau's investigation of the factors affecting the stability of book papers, those chemical properties of pulps and papers were studied which

¹ Published with approval of the Director of the Budget.

gave promise of yielding useful information. One characteristic of the papers was the content of pentosans, a substance or group of substances having the empirical formula $C_5H_8O_4$ and occurring in some fibers in varying amounts.

The most widely used method for the determination of pentosan content at present is that of the Association of Official Agricultural Chemists, which specifies heating the sample with 12-percent hydrochloric acid to convert the pentosan to furfural. The furfural is condensed and determined by precipitation as the phloroglucide, the weight of which is used to calculate the pentosan content by an empirical formula.

The method has been variously criticized, especially in that the method of determining furfural is tedious and time-consuming. In an investigation reported in the Journal of Research for April (RP1199), Herbert F. Launer and William K. Wilson have adapted, with some changes, the method of determining furfural by oxidation with excess bromate in the cold to the simple and rapid analysis of the distillates from the pentosans. Furthermore, they found that various other methods of distillation did not result in higher pentosan yields. The simple method of distillation was, therefore, retained. By a detailed study of the rate of production of volatile material during the usual distillation procedure and beyond, it was found that the cellulose in the pulps ordinarily used in papermaking gives rise, under test conditions, to a volatile material, which is determined with the furfural from the pentosans, and thus gives high values for the latter. This was substantiated with an entirely different method, and the value of 0.9 percent of pentosan was found by both methods to be applicable as a correction to all of the usual pulps, and to papers made therefrom. Experiments further indicated that cotton materials probably contain only negligible amounts of pentosans, and that the values appearing in the literature are due to the reaction products of cellulose.

RP1199 in the April number of the Journal of Research should be consulted for a complete account of this work.

HANDLING HYGROSCOPIC SUBSTANCES IN THE MICROCHEMICAL DETERMINATION OF CARBON AND HYDROGEN

In the analysis of small amounts of material of an organic nature, espe-

cially that of biological origin, very often the material isolated is hygroscopic. There have been many methods published for the analysis of this type of compound, but none is entirely satisfactory, as at some stage of the procedures the sample must come in contact with moist air. Many of the compounds are so hygroscopic that this momentary contact vitiates the results. In an article entitled "The Handling of Hygroscopic Substances in the Microchemical Determination of Carbon and Hydrogen," to be published in the analytical edition of Industrial and Engineering Chemistry, Clement J. Rodden of the Bureau's microchemical laboratory describes an apparatus whereby the sample is dried, weighed, and introduced into the carbon and hydrogen combustion apparatus without coming in contact with moisture at any stage of the operation.

PREPARATION AND PROPERTIES OF β -D-2-DESOXYGALACTOSE

The preparation and properties of a new sugar, β -D-2-desoxygalactose, are reported in a paper (RP1190) by Horace S. Isbell and William W. Pigman, which will be published in the April number of the Journal of Research. The sugar is similar to β -D-galactose, but differs in that the hydroxyl of the second carbon of galactose is replaced by hydrogen. The sugar was prepared in order to obtain information on the effect of the hydrogen and hydroxyl atoms of the second carbon on the stability of the sugar modifications and the composition of the sugar solutions. The mutarotation of the new sugar shows that it establishes an equilibrium with an alpha pyranose modification and a labile substance.

ACTION OF BAKER'S YEAST ON D-TALOSE

The observation, reported in the current literature, that *d*-talose is not fermentable by baker's yeast is based on studies made with impure talose solutions. Pure crystalline *d*-talose had been prepared in the Bureau's polarimetry section, and since the behavior of the sugar towards yeast fermentation is of importance, fermentation studies, using pure talose solutions, were made by Horace S. Isbell. The results, which are reported in the April Journal of Research (RP1191), show that baker's yeast does not ferment *d*-talose, and that it cannot be acclimatized for *d*-talose fermentation by growth on glucose or galactose media containing *d*-talose.

VOLATILIZATION OF METALLIC COMPOUNDS FROM SOLUTIONS IN PERCHLORIC OR SULFURIC ACID

Volatilization as chromyl chloride has been employed as a means of eliminating chromium prior to determinations of manganese, nickel, and vanadium in steels containing high percentages of chromium. Certain other chlorides, notably those of antimony, arsenic, germanium, mercury, selenium, and tin, are likewise known to be volatile at the temperature at which chromyl chloride is distilled. Recently, James I. Hoffman and G. E. F. Lundell have conducted experiments in the Bureau's Chemistry Division to obtain further information on the elements mentioned, as well as on all other elements that might be encountered in chemical analysis.

As reported in the April number of the Journal of Research (RP1198), it was found that, if proper conditions are established, antimony, arsenic, chromium, germanium, osmium, rhenium, ruthenium, and tin can be quantitatively distilled from perchloric acid, and germanium, arsenic, selenium, tin, antimony, and rhenium, from sulfuric acid solutions. Certain others, as bismuth,

boron, gold, molybdenum, tellurium, and thallium, may be lost in part from either perchloric or sulfuric acid solutions. From the information obtained, certain precautions against unintentional losses are evident, and certain possible separations of elements are indicated.

HEAT AND FREE ENERGY OF FORMATION OF WATER AND OF CARBON MONOXIDE

Thermodynamic data, which have become available within the past several years, have been utilized to calculate "best" values for the heats and free energies of formation of water and carbon monoxide and for the heats and free energies of the industrially important water-gas and producer-gas reactions. With each substance in the thermodynamic standard state, the values obtained, together with their estimated uncertainties, are listed in the following table based on a report by Frederick D. Rossini which will be published as RP1192 in the April number of the Journal of Research. In this table the unit of energy is the international joule based upon standards maintained at the Bureau (conversion to the conventional defined calorie may be made with the factor 1/4.1833).

Reaction	$\Delta H_{298.16}^\circ$	$\Delta F_{298.16}^\circ$	ΔH_0°
	Int. J/mole	Int. J/mole	Int. J/mole
$\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) = \text{H}_2\text{O}(\text{liq})$	-285,795 \pm 40	-237,167 \pm 47
$\text{H}_2\text{O}(\text{liq}) = \text{H}_2\text{O}(\text{g})$	44,003 \pm 13	8,506 \pm 4
$\text{H}_2(\text{g}) + 1/2\text{O}_2(\text{g}) = \text{H}_2\text{O}(\text{g})$	-241,792 \pm 42	-228,571 \pm 47	-238,905 \pm 42
$\text{CO}(\text{g}) + 1/2\text{O}_2(\text{g}) = \text{CO}_2(\text{g})$	-282,942 \pm 126	-257,072 \pm 121	-279,316 \pm 120
$\text{C}(\text{c, graphite}) + 1/2\text{O}_2(\text{g}) = \text{CO}(\text{g})$	-110,413 \pm 129	-137,155 \pm 133	-113,703 \pm 130
$\text{H}_2(\text{g}) + \text{CO}_2(\text{g}) = \text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g})$	41,150 \pm 127	28,502 \pm 130	40,411 \pm 127
$\text{C}(\text{c, graphite}) + \text{CO}_2(\text{g}) = 2\text{CO}(\text{g})$	172,529 \pm 244	119,917 \pm 248	165,613 \pm 244

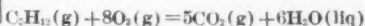
HEATS OF COMBUSTION OF TETRAMETHYLMETHANE AND 2-METHYLBUTANE

Because of their connection with chemical reactions utilized in the petroleum and synthetic-chemical industries, the three isomeric pentanes (normal pentane, 2-methylbutane, and tetramethylmethane) have become important substances in recent years. Accurate thermochemical data on these compounds are needed in studying those industrial processes in which they play a part, such as cracking, isomerization, dehydrogenation, etc.

The heat of combustion of normal pentane has been measured previously

at the Bureau. Measurements have now been completed on tetramethylmethane and 2-methylbutane. These are reported in a paper (RP1193) by John W. Knowlton and Frederick D. Rossini in the April number of the Journal of Research. With the new values, it is possible to calculate the energies of isomerization of the three pentanes, and such other fundamental thermodynamic data as are derivable therefrom.

The data of the present investigation yield the following values for the heat evolved, at 25° C and a constant total pressure of 1 atmosphere, in the reaction



in international kilojoules per mole: tetramethylmethane, 3516.53 ± 0.94 ; 2-methylbutane, 3528.03 ± 0.62 . Converted into kilocalories by means of the factor 1/4.1833, these values become, respectively, 840.61 ± 0.23 and 843.36 ± 0.15 kilocalories per mole.

Combination of these new values with those previously reported from the Bureau for normal pentane yields the following values for the energy of isomerization at 25° C. in international kilojoules per mole: normal pentane (gas)=2-methylbutane(gas) $\Delta H = -8.09 \pm 1.08$; normal pentane (gas)=tetramethylmethane(gas), $\Delta H = -19.59 \pm 1.29$; 2-methylbutane(gas)=tetramethylmethane(gas), $\Delta H = -11.50 \pm 1.13$. According to these values, the most stable of the isomeric pentanes, with regard to the energy content of the gas at 25° C. is tetramethylmethane, and the least stable is normal pentane.

INTERNATIONAL TEMPERATURE SCALE AND SOME RELATED PHYSICAL CONSTANTS

The values in degrees on some recognized scale which are assigned to very high temperatures are obtained from a mathematical formula relating temperature and radiant energy. The actual numbers depend on the value of a certain constant, c_2 , in this formula. This constant can be directly measured or calculated from other atomic constants.

In the past, the value calculated from atomic constants was considered the more accurate, and it was therefore used instead of the measured value, with which it did not agree. Recent revisions in the values of the atomic constants, particularly in the value of the charge on the electron, have changed the "accepted" values for these constants. The value of c_2 , 1.436 cm deg, calculated from the present values of the atomic constants, agrees with the measured values. In the Journal of Research for April (RP1189), H. T. Wensel shows that if this value of c_2 is used in place of the value 1.432 cm deg defining the International Temperature Scale, the value for the freezing point of platinum is lowered about 3° C. or 5° F.

The situation in regard to the radiation constants is reviewed primarily for the purpose of selecting the best value of c_2 for use in expressing high temperatures, inasmuch as this constant is used in defining the International Temperature Scale. The experimental values of c_2 and the values derived from other

related constants lead to 1.436 cm deg as the most probable value.

The analysis of the data lead to a value of $\sigma = 5.70 \times 10^{-8}$ erg sec.⁻¹ cm.⁻² deg.⁻⁴ for hemispherical radiation. Other radiation constants derived are $\pi T = 2892 \times 10^{-4}$ cm deg, $\alpha = 8.732 \times 10^{-5}$ erg cm² sec.⁻¹, and the least mechanical equivalent of light = 0.00151 watt ("new" lumen)⁻¹.

POTENTIOMETER OF HIGH ACCURACY

A potentiometer designed by Ray P. Teele and Shuford Schuhmann for measuring 10 microvolts to an accuracy of 0.01 microvolt is described in the April Journal of Research (RP1195). To obtain the desired range and accuracy, special thermal shielding, reversing key, and four-terminal resistor, as well as refinements of technique, are necessary. The principles and technique described have already found application in improving the accuracy of commercial apparatus.

THE COPPER-COPPER-SULFATE HALF-CELL FOR MEASURING POTENTIALS IN THE EARTH

Stray currents from electric railways and other sources, which flow through the earth and the conductors in it, may damage pipe lines and other buried structures if these currents are not properly controlled. Electric currents may also be used to prevent or to greatly reduce the corrosion of underground structures. For many years electrolysis engineers have used the copper-sulfate electrode to make potential measurements in the soil in order to devise methods to control or regulate stray currents. The half-cell consists essentially of a piece of copper in contact with a solution of copper sulfate, which in turn is in contact with the soil through some porous material. Such a half-cell has a more nearly constant potential than a direct metallic contact with the soil.

When exceptionally accurate potential measurements are needed, the usual form of the copper-sulfate half-cell is believed to be unsuitable, since it may be the cause of large errors. For this reason, Scott Ewing, research associate of the American Gas Association at the Bureau, has investigated the half-cell to find the reasons for its variation in potential, and if possible, to correct its faults.

The principal sources of error were found to be: (1) Variation or lack of

reproducibility of copper electrodes with respect to copper-sulfate solution; (2) polarization, that is, change in potential of the electrode when current flows between the metal and the solution; and (3) change in the potential of the half-cell with changes in temperature. It was found that spongy copper, plated on the copper electrode with a high current density, gave potentials much more reproducible than those obtained with ordinary copper. Polarization on the electrodes can also be greatly reduced by the use of spongy copper and by proper choice of measuring instruments. The effect of temperature on the potential of the half-cell was investigated so that a temperature correction may be applied to field measurements.

In an article which has been prepared for publication in the Proceedings of the American Gas Association, the requirements in the design of a half-cell suitable for field use are given, and a half-cell is described which satisfies these requirements.

SOLUBILITY OF COLORED GLAZES IN ORGANIC ACIDS

The modern demand for bright colors has resulted in the development of ceramic tableware in monochrome reds, yellows, greens, and blues, which must of necessity be matured at comparatively low temperatures, using lead oxide as a glaze constituent. The possibility exists of inadvertently placing on the market a ware coated with a glaze of such solubility as to introduce into foods a detrimental quantity of lead.

A conference of representatives of the U. S. Potters Association, the Food and Drug Administration of the Department of Agriculture, and the Bureau was held, and a series of accelerated and simulated service tests for solubility was outlined. These tests were made by R. F. Geller and A. S. Creamer on specimens from six cooperating manufacturers, primarily to determine which, if any, of the glazes constituted a health hazard, because of lead or other toxic oxides which might be dissolved from them; and, secondarily, to develop suitable test procedures for future control work.

As reported in the Journal of Research for April (RP1196), the tests showed that the lead extracted by hot, distilled vinegar (5-percent acetic acid), or a 0.5-percent solution of citric acid, left to cool in contact with the glazes for $\frac{1}{2}$ hour, would be as much as or more than the lead normally extracted

by jams and fruit juices. With the same test procedure a citric-acid solution of 10-percent strength may be required to indicate how much lead might be taken up by lemonade or vinegar.

The results indicate also that glazes of only one color, among those tested, constitute a probable health hazard. However, two other glazes from one manufacturer were found to be marginal, and a third may cause trouble if indicated corrective measures should be neglected by the maker.

DENSITY OF GLASSES AS A FUNCTION OF COMPOSITION

As part of the Bureau's investigation of the variation in density of glass with composition, J. C. Young, F. W. Glaze, and C. A. Falck, under the direction of A. N. Flett, analyzed and determined the densities of a large number of glasses made from varying amounts of powdered quartz crystals, soda ash, and potash, which had been melted in platinum crucibles in a platinum resistance furnace.

As reported in the April number of the Journal of Research (RP1197), it was found that, between certain compositions, the specific volumes of the glasses vary linearly with composition, and that the limiting compositions correspond to the eutectic compositions determined by studying the crystallizing characteristics of molten glass.

THE SYSTEM $\text{CaO-Fe}_2\text{O}_3\text{-SiO}_2$

The system $\text{CaO-Fe}_2\text{O}_3\text{-SiO}_2$ is the only remaining ternary phase diagram involving major constituents of portland cement which has not been investigated sufficiently to establish boundaries of fields, although Hansen and Bogue (J. Am. Ceram. Soc. 48, 1261 (1926)) at this Bureau had determined the products of complete crystallization. Accordingly, a study of this system was undertaken and 100 compositions have been prepared in the high CaO region of the diagram and including Fe_2O_3 concentrations as high as 70 percent, and SiO_2 contents up to 45 percent. A portion of the region investigated is of importance for its bearing on the composition of metallurgical slags.

The results, to date, of quenching determinations and heating curves on these compositions reveal the following salient features of the diagram: (1) A very large field of dicalcium silicate extending to Fe_2O_3 concentrations of nearly 65 percent; (2) a very long, nar-

row field of tricalcium silicate extending to Fe_2O_3 concentrations of nearly 50 percent; (3) a comparatively small field of dicalcium ferrite which is adjacent to the dicalcium silicate field at low SiO_2 concentrations, monocalcium ferrite being adjacent to the dicalcium silicate field at the higher SiO_2 concentrations; (4) a small field of tricalcium silicate in which the liquidus rises steeply with increasing CaO content; and (5) the absence of any ternary compounds in the area studied. The rapidity of crystallization in this system has rendered its study by the quenching method very difficult.

The extent of solid solution of Fe_2O_3 in the high temperature form of dicalcium silicate (beta) has been fixed at 1 percent or less. This was determined by holding dicalcium silicate preparations containing small amounts of Fe_2O_3 at appropriate temperatures and examining the preparations microscopically for the presence of glass. Dicalcium silicate prepared in the ordinary way proved unsuitable for this purpose as the compound on quenching always inverted to the low temperature form. However, if the initial mixture was prepared from a crystalline, hydrated dicalcium silicate,



this inversion did not occur, and the extent of solid solution in betadicalcium silicate could be readily determined. The method of preparing the hydrated dicalcium silicate has been described in J. Research NBS **21**, 617 (1938) RP1147.

PERMEABILITY AND STRENGTH OF BRICK-MORTAR JOINTS

The Bureau's Building Materials and Structures Report BMS7, Water Permeability of Masonry Walls, gives the results of a few tests indicating that the water permeability of brick masonry walls is affected by the rate of absorption of the brick at the time they are laid. More recent tests confirm this indication. Data available in the literature indicate that the tensile strength of brick-mortar joints also is affected by the rate of absorption of brick.

A convenient measure of the rate of absorption of brick, or penetrability, is the amount of water, in grams, absorbed by a brick when its flat face is immersed to a depth of $\frac{1}{8}$ in. in water for 1 minute. The penetrability of clay building bricks, when dry, ranges from less than 5 to more than 150 g. It may be reduced to any desired amount

by wetting the bricks prior to use. The practical significance of the penetrability lies in the fact that it serves as a measure of the rate at which a brick tends to absorb water when placed in contact with mortar. When bricks of high penetrability are used, they tend to cause a rapid stiffening of the mortar resulting from the absorption of part of the mixing water.

In tests of the water permeability of brick masonry walls of the tensile strength of brick-mortar joints, it has been found that the permeability of the masonry and the tensile strength of the joints is greater the lower the penetrability of the brick irrespective of whether the bricks are naturally of extremely low absorption, or whether their penetrability has been reduced by wetting prior to setting. When the penetrability exceeded 50 g, the strength of the bond was low and erratic. Similarly, the resistance to rain penetration of masonry walls was poor when the penetrability exceeded 50 g per brick, erratic but generally poor when the penetrability was between 20 and 50 g, and usually good or excellent when the penetrability was less than 20 g.

The results point strongly to the desirability of wetting absorbent bricks before laying. The only limit to the amount of wetting seems to be the practical one that if too wet the bricks will tend to slide on the joints or to "float." The data indicate, therefore, that the general rule to be followed is to have the bricks as wet as they can be laid conveniently.

PROPERTIES OF FIBER BUILDING BOARDS

Data on the properties of fiber building boards of current manufacture are contained in Building Materials and Structures Report BMS13, copies of which are obtainable from the Superintendent of Documents, Government Printing Office, at 10 cents each. The boards tested included the ordinary fiber insulating boards, interior-finish insulating boards, and a new class of commercial fiber boards known as insulation sheathing. The boards in all three classes are of low density to provide low thermal conductivity, which means good heat insulation. Low density is obtained by the interlacing of the fibers to form millions of minute air cells. These air cells provide the real barrier to the passage of heat. The wall-finish boards and the ordinary insulating boards differed only in that the former had a special finish on one side.

The new type of sheathing boards are designed for use as siding. They are nearly an inch in thickness and have asphalt treatments for protection against infiltration of water and air. The stability of the boards is the subject of a study now in progress.

SIMPLIFICATION OF SIZES AND VARIETIES OF PAPER SHOT SHELLS

The sixth revision of Simplified Practice Recommendation R31, Loaded Paper Shot Shells, which covers a simplified schedule of sizes and varieties of loaded shells to meet the requirements of sportsmen, became effective January 2, 1939. The loads comprising the standard line are classified into four groups—low cup and high cup smokeless, and progressive-burning powder, medium cup and high cup.

Originally promulgated in 1925, this recommendation effected a reduction from more than 4,000 varieties of shot shell loads to approximately 1,750. Successive revisions by the industry's standing committee, in 1926, 1927, 1930, 1931, and 1937, reduced the list to 283 loads, and a further curtailment to 262 loads was accomplished through the current, or sixth, revision. These reductions, amounting approximately to 93.5 percent of the total number of loads being produced prior to 1925, reflect the steady progress made by the industry in eliminating unnecessary varieties.

In addition to the simplified list of shot shell loads, the revised issue will include a summary of the revision conferences, the membership of the standing committee, and a list of acceptors of the recommendation.

Until the printed issue, which will be designated as R31-39, is available, free mimeographed copies of the revision may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

NEW AND REVISED PUBLICATIONS ISSUED DURING MARCH 1939

Journal of Research*

Journal of Research of the National Bureau of Standards, volume 22, number 3, March 1939 (RP1179 to RP1188, inclusive). Price 30 cents. Annual subscription, 12 issues, \$3.50.

*Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical

Research Papers*

[Pepints from the December 1938 Journal of Research]

RP1151. Laws of turbulent flow in open channels. Garbis H. Keulegan. Price 10 cents.

RP1152. Observations on crystalline silica in certain devitrified glasses. Arthur Q. Tool and Herbert Insley. Price 10 cents.

RP1153. Expansion effects on the inversion of silica crystals in certain devitrified glasses. Arthur Q. Tool and James B. Saunders. Price 5 cents.

RP1154. Portable Geiger counter unit. Leon F. Curtiss. Price 5 cents.

RP1155. Concrete as a protective material against high-voltage X-rays. George Slinger, Lauriston S. Taylor, and Arvid L. Charlton. Price 5 cents.

RP1156. On the accuracy of radio field-intensity measurement at broadcast frequencies. Harry Diamond, Kenneth A. Norton, and Evan G. Lapham. Price 10 cents.

RP1157. Correlation of an electrolytic corrosion test with the actual corrosiveness of soils. Irving A. Denison and Robert B. Darnielle. Price 5 cents.

RP1158. Method for determining uniformity of temperature in cryostats. Martin Shepherd. Price 5 cents.

RP1159. Trends of characteristics of the ionosphere for half a sunspot cycle. Newbern Smith, Theodore R. Gilliland, and Samuel S. Kirby. Price 5 cents.

RP1160. Properties of purified normal heptane and isooctane (2, 2, 4-trimethylpentane). Donald B. Brooks. Price 5 cents.

RP1162. Resistivity and power input in the cesium discharge at high current density. Fred L. Mohler. Price 5 cents.

Commercial standards*

CSO-39. Commercial Standards and their value to business. (2d ed.) (Supersedes CSO-30.) Free on application to the National Bureau of Standards.

News Bulletin, 50 cents per year; Journal of Research, \$3.50 per year (United States and its possessions, and Canada, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Newfoundland (including Labrador), Panama, and Venezuela); other countries, 70 cents and \$4.50, respectively.

Building Materials and Structures²

[Persons who wish to be notified of new publications in the "Building Materials and Structures" series as soon as they are available should write to the Superintendent of Documents, Government Printing Office, Washington, D. C., asking that their names be placed on the special mailing list maintained by him for this purpose.]

During the past month the following publications in this series have been issued:

- BMS12.** Structural properties of "Steelex" constructions for walls, partitions, floors, and roofs sponsored by Steel Buildings, Inc. Herbert L. Whittemore, Ambrose H. Stang, and Vincent B. Phelan. Price, 15 cents.
- BMS13.** Properties of some fiber building boards of current manufacture. Charles G. Weber and Samuel G. Weissberg. Price, 10 cents.

Technical News Bulletin²

Technical News Bulletin 263, March 1939. Price 5 cents. Annual subscription, 50 cents.

MIMEOGRAPHED MATERIAL**Letter Circulars**

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

- LC544.** Policy of the National Bureau of Standards with regard to tests for agencies outside the Bureau.

² Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents per year; Journal of Research, \$3.50 per year (United States and its possessions, and Canada, Colombia, Cuba, Dominican Republic, Ecuador, Guate-

RECENT BUREAU ARTICLES APPEARING IN OUTSIDE PUBLICATIONS³

Current distribution in electrodeposition. II. Point-plane and line-plane systems. Charles Kasper. Mo. Rev., Am. Electroplaters Soc. (90 Maynard St., Springfield, Mass.) 26, 91 (February 1939).

Experimental study of deformation and of effective width in axially loaded sheet-stringer panels. Walter Ramberg, Albert E. McPherson, and Sam Levy. Technical Note No. 684 (National Advisory Committee for Aeronautics, Washington, D. C.) (February 1939).

Note on the evaluation of leather by means of X-ray diffraction patterns. Roy C. Bowker and Harry J. McNicholas. J. Am. Leather Chemists Assn. (Ridgway, Pa.) 34, 101 (February 1939).

New horizons for silver. A. J. Dornblatt. The Frontier (Armour Institute of Technology, Chicago, Ill.), 2, 6 (March 1939).

Plastic calking materials. D. W. Kessler. Rev. Soc. Residential Appraisers (333 N. Michigan Ave., Chicago, Ill.) 5, Nos. 2, 3 (February 1939).

Use of low voltages for extension lamps and portable appliances. Morton G. Lloyd. Trans. Silver Jubilee Safety Cong. (National Safety Council, 20 No. Wacker Drive, Chicago, Ill.) 257 (1938). Abstract in Elec. World (330 West 42d St., New York, N. Y.) 111, 440 (February 11, 1939).

mala, Honduras, Mexico, Newfoundland (including Labrador), Panama, and Venezuela); other countries, 70 cents and \$4.50, respectively.

³ These publications are not obtainable from the Government. Requests should be sent direct to the publishers.

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